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CLASSIFICATION SECRET [redacted]

CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

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COUNTRY Hungary

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SUBJECT Instruction at the Physical Chemistry Institute, Eoetvoes Lorand University

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PLACE ACQ [redacted]

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NO. OF ENCLS. (LISTED BELOW)

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THIS IS UNEVALUATED INFORMATION

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(a) "Introduction to the Methods of Measurement" in which the theory and practice of measurements and counting were explained to the students; it was given for one hour each week.

(b) "Physical-Chemistry Proseminar" was given once every two weeks. For this the students were divided into groups of 25 each for laboratory work, one four-hour period every two weeks. In the two semesters they were required to complete satisfactorily 12 experiments out of a possible 14. The apparatus was set up for the students by assistants. There were three assistants in the laboratory; one was designated leader of the group. The group leader read the reports of experiments, gave oral quizzes, offered advice, and in general, was responsible for seeing to it that each group passed the course.

2. The following basic physical chemistry measurements were carried out by chemistry students in their first year:

(a) Mass measurement (on analytical balance by the Borda and Gauss method)

(b) Thermometer calibration

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(c) Measurement of the density of solids by the float method

(d) Measurement of the density of liquids by the pycnometer method and Mohr-Westphal balance

(e) Measurement of steam density by the Dumas-Winkler and V. Meyer (determination of molecular weight) method

(f) Determination of concentration by lowering the freezing point

(g) Determination of the molecular weight by increasing the boiling point

(h) Measurements of solution heat of salt solution, neutralization heat, and ice melting heat.

3. Students were informed one week in advance about the measurements they were to do in the laboratory. Three kinds of measurements were done simultaneously. For instance, a, b, and c, or d, e, and f, etc. Eight students worked individually on each measurement. If a student did not understand some point mentioned in a lecture or in the textbook, a teaching assistant explained it to him at a consultation before the laboratory exercise. Students kept records of all laboratory measurements. They could work out the problems at home and hand in the results of calculations two days after completion of the experiment. Teaching assistants examined the students' notes on their measurements, and checked the correctness of their calculations; if the problems did not contain more than a certain percentage of errors, the results were accepted. If the number of errors exceeded the percentage limit, the student had to do the measurement again. Each student was required to have at least 12 acceptable measurements in two semesters. While the experiments were in progress, students were quizzed by the teaching assistants. The students' work was evaluated and graded according to a numerical scale; 5 was excellent; 4, good; 3, average; 2, satisfactory; 1, unsatisfactory. Students were graded on the basis of their theoretical grasp of the subject and the practical results of their experiments. If they were sick, they were permitted to take special examinations later. Any damage done to laboratory equipment through the student's neglect, ie, breakage, etc, had to be paid for by the student. If the student was poor, especially if he was of peasant or worker origin, he could be excused from paying for the damage.

4. The basic textbook used in the first year and throughout the four-year course in Physical Chemistry was: Fizikai-Kemia Praktikum (Physical Chemistry Handbook) by Dr Tibor Erdey-Gruz and Dr Janos Proszt, fifth edition, Budapest 1951, 500 pp, published by the Government Printing Office.

5. During their second year, students took courses in other branches of chemistry and continued courses in physical chemistry in their third year.

6. Third year chemistry students attended a course entitled "Fizikai Kemia" - (Physical Chemistry) five hours per week. This course was given by Dr Tibor Erdey-Gruz and the textbook was Fizikai Kemia (Physical Chemistry) by Dr Tibor Erdey-Gruz and Dr Geza Schay, head of the Physical Chemistry Institute of the Polytechnic University in Budapest. The textbook was printed in 1951 by the Government Printing Office in Budapest. In addition to the lecture,

the students met two hours weekly in groups of 20; this meeting was presided over by a teaching assistant. At the end of the semester students were quizzed by the teaching assistants. The first semester lasted from 8 September to 22 December; quizzes were held during the semester and in January. The second semester lasted from 1 February to 26 May. Yearly final examinations were held in June. Students were asked three questions at the yearly examination which was given by the professor or instructor. The result of the examination was noted in the student's book with the date, and the signature of the professor. If the student did not appear for the final examination, he was "flunked". Teaching assistants helped the students in preparations for the examination.

7. In their fourth year, chemistry students continued their work in the laboratory and completed it in two semesters; eight hours per week were spent in the laboratory. They attended lectures on "Exercises in the physical chemistry methods of measurements and calculations". In connection with this course a two-hour seminar was held each week. The leader of the laboratory work had to be at least an assistant professor. In addition, four teaching assistants were present in the laboratory to guide and supervise the students. The students kept notes on their measurements as they had the first year.

8. The most important problems were:

<u>General Physical Chemistry Measurements</u>:

(a) Measurement of the velocity of gas current; rheometer calibration

(b) Measurement of the velocity of the flow of liquids, Venturi tube calibration

(c) Measurement of the internal friction of gases

(d) Measurement of the internal friction of liquids by Ostwald viscosimeter

(e)-(f) Measurement of surface tension:

(1) With stalagmometer (drop formation)

(2) On the basis of bubble pressure

(g)-(h) Measurement of boiling point temperature:

(1) Static method

(2) Cynamic method

(i) Theoretical determination of the constant of the vibrating plate for viscosity measurements

(j) Measurement of equilibrium between a liquid and its vapor

(k) Measurement of the solubility of solids

(l) Solubility of liquids in liquids

(m) Solubility of gases in liquids

(n) Measurement of the diffusion constant by the Ocholm method

(o) Measurement of temperature of transformation

(p) Examination of heat conductivity of gases

(q) Adsorption of acetic acid on active charcoal

(r) Chromatographic analysis

(s) Phase diagram determination

Electrochemical Measurements:

(t) Study of the Ohm Law

(u) Study of the Faraday Law

(v) Measurement of MKF of Daniell cell ($Cu/CuSe_4/Zn$)

(w) Study of concentration cell electrometive force and determination of concentration

(x) Determination of the efficiency of charging of storage battery

(y) Measurement of dissociation electrometive force

(z) Potentiometer titration

(aa) Conductimeter titration

(bb) Measurement of dissociation constant from conductivity

(cc) Solubility of weak electrolytes

(dd) Determination of the product of solubility by electrometive force

(ee) Measurement of transport number by Hittorf method

(ff) Measurement of transport number by limit of moving surface

(gg) Redox potential measurement

(hh) pH Measurement with hydrogen electrode (by automatic compensator)

(ii) pH Measurement with hydroquinone electrode

(jj) pH Measurement with indicator and buffer solutions

(kk) pH Measurement with indicator and photometer

(ll) Copper and nickel separation by gravimetric method

(mm) Measurement of internal resistance of galvanic cell

(nn) Polarographic analysis

(oo) Measurement of dielectric constant and determination of dipole moments

(pp) Measurement of magnetic susceptibility by the Quincke method

Equilibrium Measurements and Reaction Kinetics:

(qq) Determination of the equilibrium constant of water gas reaction

(rr) Measurement of the speed of disintegration of H_2O_2 (hydrogen peroxide)

(ss) Measurement of the speed of saponification of ethylacetate

(tt) Determination of Oxalic acid equivalent - quantitative factors

(uu) Measurement of sugar cane inversion speed

Optical Measurements:

(vv) Determination of concentration of optical rotation

(ww) Measurement of index refraction with the Pulfrich refractometer

(xx) Measurement of concentration of immersion and Abbe refractometer

(yy) Measurement of index refraction of fat and oil with Wollny refractometer

(zz) Recording of absorption curve with grating spectroscope

(aaa) Recording of absorption curve with Pulfrich photometer
Radioactive Measurements:

(bbb) Alpha radiation examination with alpha ray electroscope

(ccc) Beta radiation with beta ray electroscope

(ddd) Gamma radiation examination with gamma ray electroscope

9. In order to receive credit, students had to complete satisfactorily at least 75-80 % [illegible] of the material, that is, they had to complete at least 42-45 measurements. If they fell below this minimum they could make it up in supplementary tests within a year. Evaluation of the work was done in the same manner as for first year exercises. The textbook Fizikai-Kemia Praktikum, 1951, fifth edition, served as a guide for laboratory exercises. Organization of laboratory work was similar to that for the first year. Students were notified at least two weeks in advance of the problems to be solved in laboratory exercises so that they would have time for preparation; they could consult the instructors before the exercises. All measurements were done simultaneously in contrast to first year laboratory measurements where only three kinds of measurements were done at the same time. The reason for this was that there was only one of the more expensive instruments, and 45-50 students worked at the same time. As there were some 100 students yearly, they had to work in two groups. One group worked on Wednesdays and the other on Thursdays.

10. Students of chemistry chose their field of specialization in the third year of their studies. About 40% specialized in organic chemistry, 20% in inorganic and analytical chemistry, 30% in physical chemistry or general chemistry, and 10% in colloid chemistry.

11. Third and fourth year students, after selecting their field of specialization, attended special courses in their field as well as the laboratory courses obligatory for all chemistry students. Upon completion of these courses they spent 30 hours per week in special laboratory work for one semester. For instance, if a student specialized in inorganic analytical chemistry, he learned the special analytical methods either in the third year (after successful completion of the second year laboratory exercises) or in the ninth semester of his studies in chemistry.

12. According to the plan of instruction, general chemistry students completed their physical chemistry exercises in the fourth year. Students of physical chemistry did not complete their exercises until the ninth semester. They were expected to complete several measurements in technical problems, ie, the determination of the speed of vaporization. The students checked the literature available on the methods generally used. critically examined such methods, evaluated the advantages of each method, and pointed out the degree of accuracy. Then he selected the most suitable method, and chose the necessary instruments. The Institute provided the necessary equipment; the student tried it, and, if necessary, adjusted it until he was able to reproduce the standard given in the literature up to the maximum accuracy. Thereupon, the student reported on his work, his criticism of the methods, reasons for the selection of a particular method, and the results of his measurements.

13. Work in advanced laboratory was supervised by the professor, docent or an aspirant. At least once in the course of the semester, the student gave an account of his work before the teaching staff. A student could take the oral examination for the doctors degree only after the completion of the laboratory work; in physical chemistry it included an examination on the lectures given in the third year, seminar, and laboratory measurement technique. The examination was given by the professor, his docent or adjunctus, and lasted at least half an hour. If the student did not pass the examination he was allowed to try it twice more.

14. In his last year of study, after the student had passed his rigerosum (recently a state examination) before a committee set up for the purpose, and after registering for a job, he received a notice from a factory, research institute, or university to report for work. If he had not accepted the position assigned to him, he would probably have been without work for months. An employee could not leave his job of his own free will; if he did so he would not get employment for at least six months, and, according to a regulation of January 1952, he could be sentenced to five years in prison. On the other hand he could be released with two weeks notice or transferred to another place of work under the jurisdiction of the ministry.

15. First year students preparing to teach chemistry and physics attended the same lectures and did the same laboratory exercises as the first year chemistry students. There were about 80 students enrolled in this course. In two semesters they had to have at least eleven laboratory measurements accepted. Third year students in this category attended lectures given by the professor of physical chemistry three hours per week for two semesters. The textbook used was the same as for chemistry students in chemistry, Fizikai Kemia. Conferences for students, in groups of 20, were held two hours per week under the guidance of a teaching assistant. In addition there were consultations and several quizzes during the semester. At the end of each

semester there was an oral examination given by the professor, associate professor, or assistant professor. The plan of the examination and grading were the same as for chemistry students. Fourth year students preparing for the teaching profession in chemistry and physics worked in the physical chemistry laboratory five hours per week and attended the course on the methods of measurement in physical chemistry one hour per week. They selected, from those exercises prescribed for chemistry students, the ones which could be demonstrated in intermediate schools (gymnasiums). The textbook used was Fizikai Kemia Praktikum (Physical Chemistry Handbook) 5th Edition, 1951, by Dr Tibor Erdey-Gruz and Dr Janes Proszt.

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